CLAIMS

1. A decoder comprising:

a branch metrics circuit configured to generate a plurality of branch metric signals; and

a state metrics circuit configured to (i) add said branch metric signals to a plurality of state metric signals to generate a plurality of intermediate signals, (ii) determine a next state metric signal to said state metric signals, (iii) determine a normalization signal in response to said intermediate signals, and (iv) normalize said state metric signals in response to said normalization signal.

2. The decoder according to claim 1, wherein determining said next state metric signal and determining said normalization signal are performed in parallel.

3. The decoder according to claim 2, wherein determining said next state metric signal is a maximum operation of said intermediate signals with a correction factor.

4. The decoder according to claim 3, wherein determining said normalization signal is a maximum operation of said intermediate signals independent of said correction factor.

5. The decoder according to claim 4, wherein said state metrics circuit is further configured to reduce said normalization signal in response to said correction factor.

6. The decoder according to claim 1, wherein each of said state metric values is represented by a fixed point variable.

7. The decoder according to claim 6, wherein said state metrics circuit is further configured to adjust said normalization signal to prevent an overflow of said state metric signals.

8. The decoder according to claim 7, wherein said normalization signal is adjusted in response to a correction factor used in determining said next state metric signal.

9. The decoder according to claim 8, wherein (i) determining said next state metric signal and determining said

normalization signal are performed in parallel, (ii) determining said next state metric signal is a maximum operation of said intermediate signals with a correction factor, and (iii) determining said normalization signal is a maximum operation of said intermediate signals.

10. The decoder according to claim 9, further comprising a second decoder coupled to said decoder to form a turbo decoder.

11. A maximum a posteriori decoding method comprising the steps of:

(A) adding a plurality of branch metric signals to a plurality of state metric signals to generate a plurality of intermediate signals;

(B) determining a next state metric signal to said state metric signals in response to said intermediate signals;

(C) determining a normalization signal in response to said intermediate signals; and

(D) normalizing said state metric signals in response to said normalization signal.

12. The method according to claim 11, wherein said steps of determining said next state metric signal and determining said normalization signal are performed in parallel.

13. The method according to claim 12, wherein step (B) comprises the sub-steps of:

performing a maximum operation on said intermediate signals; and

adding a correction factor.

14. The method according to claim 13, wherein step (C) further comprises the sub-step of performing a maximum operation on said intermediate signals independent of said correction factor.

15. The method according to claim 14, further comprising the step of reducing said normalization signal in response to said correction factor.

16. The method according to claim 11, further comprising the step of representing each of said state metric signals, said

branch metric signals, said intermediate signals, and said normalization signal as a fixed point variable.

17. The method according to claim 16, further comprising the step of adjusting said normalization signal to prevent an overflow of said state metric signals.

18. The method according to claim 17, wherein said normalization signal is adjusted in response to a correction factor used in determining said next state metric signal.

19. A decoder comprising:

means for adding a plurality of branch metric signals to a plurality of state metric signals to generate a plurality of intermediate signals;

means for determining a next state metric signal to said state metric signals in response to said intermediate signals;

means for determining a normalization signal in response to said intermediate signals; and

means for normalizing said state metric signals in response to said normalization signal.